Ontario

Remote Sensing of Vehicle Exhaust Emissions

"Sciencetech has established the feasibility of an exceptional remote emission sensing technology. We are seeking visionary partners to assist in taking the technology into the marketplace."

Alex Quaglia
President, Sciencetech Inc.
London, Ontario

THE COMPANY

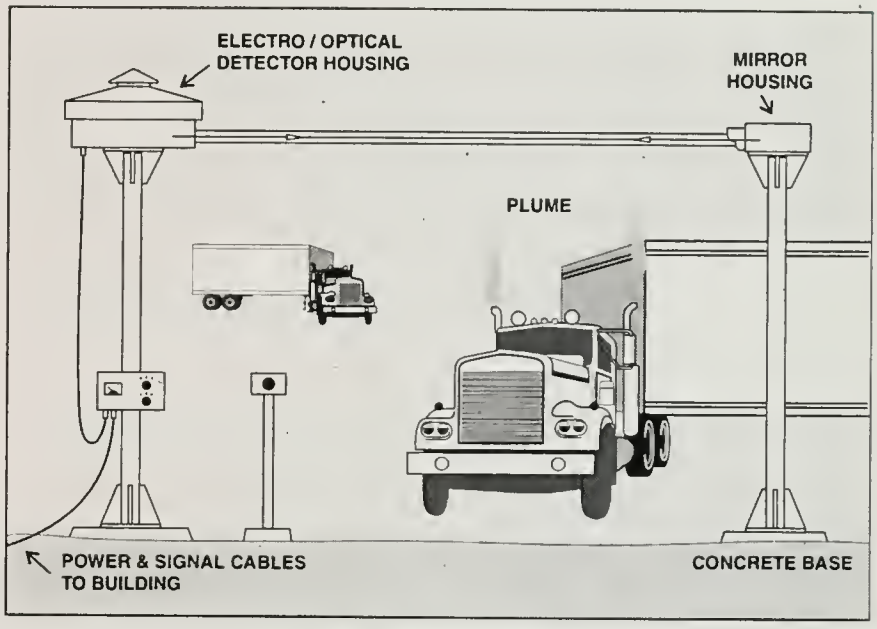
Sciencetech Inc. is a Canadian company that specializes in new product development, generally in applied spectroscopy instrumentation for scientific, medical and environmental applications.

Founded in 1985, Sciencetech has the diverse capabilities needed for sophisticated instrument design. In addition to research and development, the company has the engineering and production staff and facilities to manufacture single prototypes as well as production runs of several hundred units or more. Sciencetech has a staff of about 15 scientists, engineers and technicians. Its head office and manufacturing facility are located in London, Ontario. A research laboratory and research and development office are located at McMaster University in Hamilton, Ontario.

In addition to instrumentation, Sciencetech offers consulting services and custom research and development. Sciencetech has established a solid presence not only in Canada, but also in the United States, Mexico, Argentina, Spain and Kuwait.

CHALLENGE

Vehicle exhaust emissions have contributed significantly to the degradation of urban air quality across North America. Acts and regulations being implemented in many jurisdictions require the use of *on road tests* to monitor exhaust emissions from moving vehicles. This requires reliable remote sensing instruments which are performance and cost effective.



Truck emissions remote sensing device - equipment configuration.

Authorities are currently enforcing regulations by stationary testing because *on road* devices have not been proven effective. Sciencetech has designed a device which will allow authorities and companies to:

* undertake random inspections and identify gross emitters;
* undertake random inspections to identify tampering with emission controls;
* collect baseline data for fleet analysis;
* routinely monitor air quality in specific high traffic areas;
* prescreen vehicles for detailed stationary tests.

TECHNOLOGY DESCRIPTION

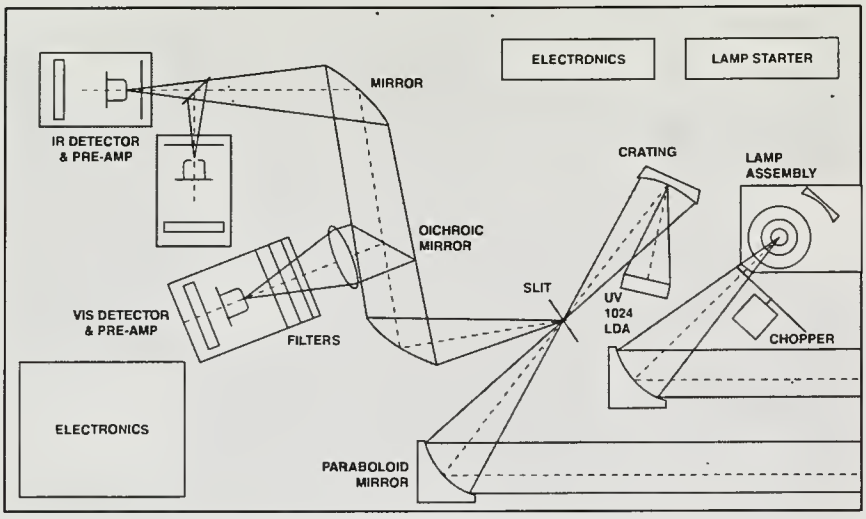
Sciencetech studied the feasibility of developing an instrument which will remotely monitor exhaust emissions from moving vehicles. An assessment of available technologies for remote measurement of trace gases, and of smoke opacity, was carried out.

Typical exhaust emission levels from in-use vehicles were analysed based on current and future emission regulations. A conceptual design was developed for an instrument which can observe the exhaust plumes of passing vehicles from the roadside and assess the emission levels of specific pollutants.

RESULTS

As a result of the feasibility work, a prototype instrument has been designed by Sciencetech capable of detecting carbon monoxide(CO), unburned hydrocarbons(HC), nitrogen oxides(NOx) and particulates (diesel smoke, measured as opacity).

Optical detection methods will identify and quantify the pollutants. A broadband light source (Xe lamp) emits in the infrared, visible and ultraviolet. Detectors with filters detect the absorption in the photopic visible region (for opacity) and the infrared (for CO, CO_2 and HC). A linear diode array measures UV transmission (NO,



Sciencetech vehicle emissions remote sensing device.

aromatic hydrocarbons). The carbon dioxide(CO_2) concentration is used to measure the amount of exhaust gas captured by the beam and, as a result, to normalize all the pollutants.

The instrument is designed to be vibration insensitive to avoid misalignment. A video camera is triggered to snap an image of the vehicle.

Measurements for trucks will be taken at weight stations as trucks (under load) accelerate past the instrument from a stop. Cars could be observed by implementing the instrument on highway on-ramps or after traffic lights.

TECHNOLOGY OPPORTUNITIES

Sciencetech has conducted an extensive study of market interest in the proposed instrument. The demand for remote monitoring instruments appears to be significant, particularly for truck monitoring. No system is currently available with the capability of measuring CO, CO_2, aromatic and aliphatic HC, NOx and particulates. Potential sales are estimated in the $50 million range over a five-year period following product introduction.

The company is targeting government agencies, private agencies and consulting firms, trucking associations, automobile and truck manufacturers, airports, railroad stations, shipping yards, university and research institutions.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The preliminary feasibility assessment of this technology was partially funded by the Ontario Ministry of Environment and Energy under the Environmental Technologies Program, and by the Ontario Ministry of Transport. Additional pre-commercialization work is required to prove the technical concepts and develop marketing strategies.

Financial and managerial partners are being sought to complete the pre-commercial work prior to introducing the system to the international marketplace.

Industrial companies located in Ontario may seek ministry/industry services which will help them:

- ✲ reduce, reuse and recycle solid waste;
- ✲ effectively remediate historic pollution and destroy hazardous contaminants;
- ✲ reduce or eliminate liquid effluent and gaseous emissions;
- ✲ use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

FOR FURTHER INFORMATION, PLEASE CONTACT:

Dr. Graciela Zarate
Technical Development Scientist
Sciencetech Inc.
McMaster University,
Nuclear Research Building
1280 Main St. W., Rm. B102A
Hamilton, Ontario L8S 4K1
Tel: (905) 525-9140 Ext. 23123

John Jefferies
Program Development Branch
Ministry of Environment and Energy
40 St. Clair Ave. W., 11th Floor
Toronto, Ontario M4V 1M2
Tel: (416) 314-3926
Fax: (416) 314-4160

Doug Vallery
Industry Conservation Branch
Ministry of Environment and Energy
56 Wellesley St. W., 14th Flr.
Toronto, Ontario M7A 2B7
Tel: (416) 327-8329
Fax: (416) 327-1261
Internet: vallerd@gov.on.ca

MINISTRY OF ENVIRONMENT AND ENERGY SERVICES

For information on Ministry of Environment and Energy assistance to industry, please contact the Industry Conservation Branch at
(416) 327-1492, or
Fax: (416) 327-1261

Renseignements en français: Ministère de l'Environnement et de l'Énergie, 56 rue Wellesley ouest, Toronto, Ontario M7A 2B7
Téléphone: (416) 327-1253 Télécopieur: (416) 327-1261

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